Catalogue no. 11F0019M — No. 326
ISSN 1205-9153
ISBN 978-1-100-16321-5

Research Paper

Analytical Studies Branch Research Paper Series

A Note on Pension Coverage and Earnings Replacement Rates of Retired Men: A Closer Look at Distributions

by Yuri Ostrovsky and Grant Schellenberg

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July 2010

Published by authority of the Minister responsible for Statistics Canada

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La version française de cette publication est disponible (n° 11F0019M au catalogue, n° 326).

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..	not available for a specific reference period
...	not applicable
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0^s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p}	preliminary
^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E}	use with caution
F	too unreliable to be published

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Abstract

In spite of the importance of registered pension plans (RPPs) in discussions of Canada's retirement income system, very few Canadian studies have examined the financial outcomes experienced by RPP members and RPP non-members. Using data from the Longitudinal Administrative Database (LAD), this paper compares the distributions of earnings replacement rates achieved by retired men who were or were not members of a registered pension plan (RPP) in 1991 and/or 1992. The distributions of earnings replacement rates of men who were not RPP members are far more dispersed than those of men who were RPP members. And while the **average** earnings replacement rates of the two groups are generally comparable, the **median** earnings replacement rates of RPP non-members are lower than those of RPP members as a result of asymmetry in the distributions.

Key words: retirement, pensions, seniors, income

Executive summary

In spite of the importance of registered pension plans (RPPs) in discussions of Canada's retirement income system, very few studies have examined the financial outcomes experienced by registered pension plan (RPP) members and RPP non-members. One exception is Ostrovsky and Schellenberg (2009), which provides a broad overview of financial outcomes, focusing on **average** incomes and **average** replacement rates achieved by RPP members and non-members.

This study builds on the Ostrovsky and Schellenberg (2009) analysis by examining the **range** of outcomes experienced by male RPP members and non-members—specifically, the distributions of earnings replacement rates achieved by each group. The earnings replacement rates of RPP non-members are far more dispersed than those of RPP members, reflecting a greater diversity of financial outcomes. Larger shares of RPP non-members than members have earnings replacement rates below various thresholds (e.g., less than 0.50 or less than 0.60), but, at the other end of the distribution, larger shares also have earnings replacement rates of 1.0 or more. While the **average** earnings replacement rates of the two groups are comparable, the **median** earnings replacement rates of RPP non-members are lower than those of RPP members. Among retired men from the middle of the earnings distribution, the median replacement rates of RPP non-members are seven to nine percentage points lower than the median replacement rates of RPP members.

1 Introduction

The design of Canada's retirement income system and the extent to which working-age Canadians are saving adequately for old age continue to be important public-policy issues. Information on wealth serves to inform discussion of these issues, as such information can be used to estimate the income streams that future cohorts of retirees could be expected to generate. However, wealth data remains very limited. Consequently, discussions of retirement income often focus on the saving behaviours of working-age Canadians or the incomes of today's seniors to gauge how tomorrow's seniors might fare.

Registered pension plans (RPPs)—also referred to as *occupational pension plans*, *employer pension plans*, or *workplace pension plans*—are an important aspect of this discussion. Not only are RPPs a central component of Canada's retirement income system, but they are also a source of concern given declining rates of pension coverage (particularly in the private sector), changes in the characteristics of RPPs, and concerns about the financial health of some private sector plans.

Yet, in spite of the importance of RPPs, very few Canadian studies have examined the financial outcomes experienced by registered pension plan (RPP) members and non-members. One exception is Ostrovsky and Schellenberg (2009). In that study, longitudinal data are used to examine the retirement and financial outcomes of individuals who were RPP members and individuals who were not RPP members when in their mid-fifties in 1991. Among all individuals in the sample, RPP non-members receive lower average incomes from pensions and superannuation than do RPP members, but higher average incomes from other sources, including investments, dividends, and capital gains. The results also show that RPP non-members are more likely than RPP members to continue working into their late sixties and early seventies. However, among individuals who are retired, RPP non-members achieve, on average, earnings replacement rates comparable to those of RPP members.

Ostrovsky and Schellenberg (2009) provide a broad overview of financial outcomes, focusing on **average** incomes and **average** replacement rates achieved by RPP members and non-members. However, the study does not provide information on the **range** of outcomes experienced by individuals in those groups. While the range of outcomes may be quite different between groups, the **average** outcomes for the two groups may be similar. Indeed, as shown in this paper, the shares of RPP members and non-members with earnings replacement rates above or below various thresholds vary considerably, and yet yield average replacement rates that are comparable for the groups as a whole. And while the replacement rates of RPP members are quite tightly clustered around the mid-point of the distribution, the replacement rates of RPP non-members are far more dispersed, reflecting a greater diversity of financial outcomes.

In addition to examining the distribution of earnings replacement rates in 2006, this paper also incorporates data for 2007 recently added to the Longitudinal Administrative Database (LAD). Using this additional year of data, the average annual earnings replacement rate achieved by retirees is calculated over the years 2005, 2006, and 2007. The intent is to reduce the influence of anomalous events in a single year, such as lump-sum RRSP (Registered Retirement Savings Plan) withdrawals or one-time realization of capital gains, on the replacement rate observed. The adjustment results in slightly higher earnings replacement rates among retired men, particularly those who are not RPP members.

The paper begins with a short overview of the data source, sample, and concepts used in this study. This discussion is kept to a minimum since these issues are discussed in detail in

Ostrovsky and Schellenberg (2009). We then present descriptive information on the earnings replacement rates achieved by RPP members and RPP non-members. Supplementary charts and a text table are included in the appendix, along with results from several multivariate models.

2 Data source, sample, and concepts

The data source and methods used for this study closely follow Ostrovsky and Schellenberg (2009). The data are drawn from the 20% version of the LAD, which is derived from taxation data.

The information in the LAD does not allow RPP members and RPP non-members to be distinguished on the basis of retirement income received in old age. Instead, pension membership must be identified on the basis of pension contributions made while individuals are still in the workforce. Complete information on such contributions is available back to 1991. The age at which replacement rates are calculated is a further consideration for sample selection. There is merit in calculating replacement rates for seniors in their seventies, rather than their sixties, since, in this way, there is greater likelihood of capturing income streams following mandatory conversion of RRSP assets.

For these reasons, this analysis is limited to tax filers who were aged 55 to 57 in 1991 and hence aged 70 to 72 in 2006. Several other selection criteria are imposed. Participation in, and contributions to, RRSPs and RPPs are predicated on labour force participation and receipt of employment earnings. Consequently, the sample is limited to individuals who filed a tax return in 1989, 1990, and 1991, who had positive earnings in each of those years, and whose average annual earnings over that period were $10,000 or more.[1] Individuals who were self-employed at age 55 to 57 are excluded because they were generally not eligible to contribute to RPPs.[2] However, those who had become self-employed by age 70 to 72 are included. Tax filers in the sample are categorized into five groups of equal size according to their average annual earnings over 1989-1991. The extent to which earnings are replaced by other income sources at age 70 to 72 can thus be examined at different points across the distribution.

The LAD includes a Pension Adjustment variable that captures both employee and employer contributions to RPPs, as well as contributions to Deferred Profit Sharing Plans. Positive values on the Pension Adjustment variable in 1991 and 1992 are coded as follows in each year: "1" to indicate RPP membership and "0" to denote RPP non-membership. The focus of this analysis is on the earnings replacement rates of individuals who: (i) did not have pension coverage in either 1991 or 1992; or (ii) who had pension coverage in both years.

Earnings replacement rates are calculated as in Ostrovsky and Schellenberg (2009). That is, total income (before taxes) in 2006 is included in the numerator, and average annual earnings (before taxes) received in 1989, 1990, and 1991 are included in the denominator. In addition, a supplementary earnings replacement rate is calculated using the same approach, but averaged over the years 2005, 2006, and 2007.

The discussion of earnings replacement rates in this paper is limited to "retired" individuals, defined as those individuals whose earnings in 2006 were less than 10% of the average annual

1. Earnings are defined as the sum of T4-reported earnings (i.e., wages, salaries and commissions) and other employment income (such as tips and gratuities).
2. Tax filers with modest net self-employment incomes (less than $500 annually) were retained in the sample.

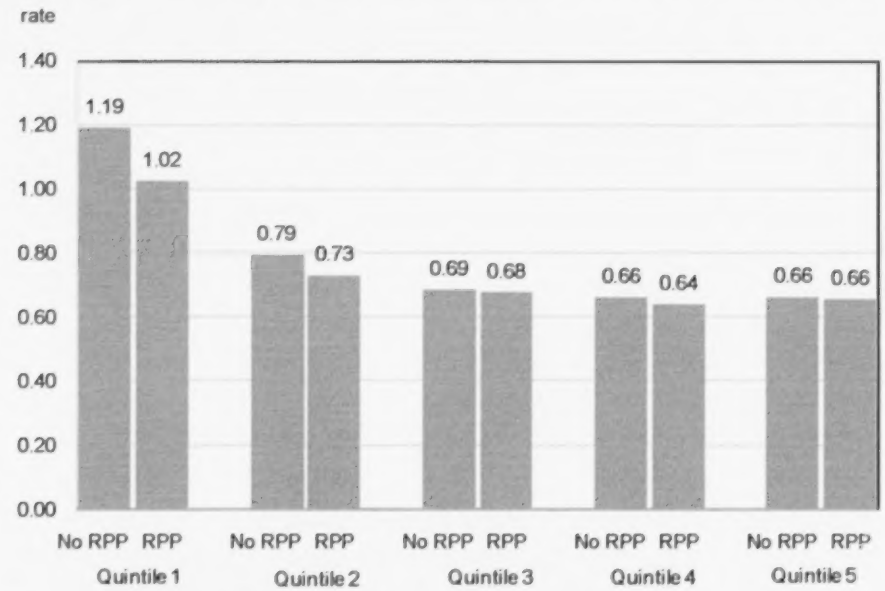
earnings that they received over the 1989-1991 period. Results based on the average earnings replacement rate over the 2005 to 2007 period are limited to individuals who were retired in those years.

Finally, as noted in Ostrovsky and Schellenberg, women who were in their mid-fifties in 1991 had considerably lower employment rates than women in that age group do now, and fewer still met the sample selection criteria used for this study. Consequently, a sample of women would be much less representative of the total population of women than a sample of men is for the total population of men. For that reason, the analysis presented below is limited to men.

3 Descriptive results

As documented in Ostrovsky and Schellenberg (2009), average earnings replacement rates of retired men in the sample do not differ significantly between RPP members and RPP non-members in 2006. This is evident in Chart 1, particularly for retired men in the third, fourth, and fifth 1989-1991 earnings quintiles.[3] Average replacement rates are somewhat lower among RPP members than non-members in the first and second quintiles.

Chart 1
Average earnings replacement rates of retired men aged 70 to 72, by pension coverage and pre-retirement earnings quintile, 2006

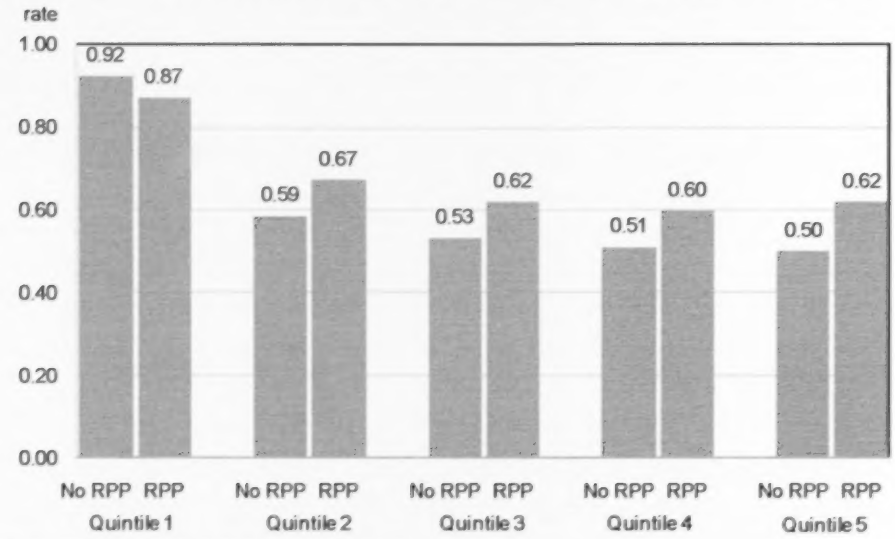


Note: "RPP" stands for registered pension plan.

3. Readers should note that these are unadjusted averages, given that socio-economic characteristics, such as immigration status, marital status, years since retirement, and pre-retirement earnings, are not taken into account.

Differences are evident between RPP members and RPP non-members when median replacement rates in 2006 are compared.[4] More specifically, the median replacement rates of RPP members in Q2, Q3, and Q4 are about 9 percentage points higher than the median replacement rates of RPP non-members (Chart 2). Among retired men in Q5, the difference is 12 percentage points.

Chart 2
Median earnings replacement rates of retired men aged 70 to 72, by pension coverage and pre-retirement earnings quintile, 2006



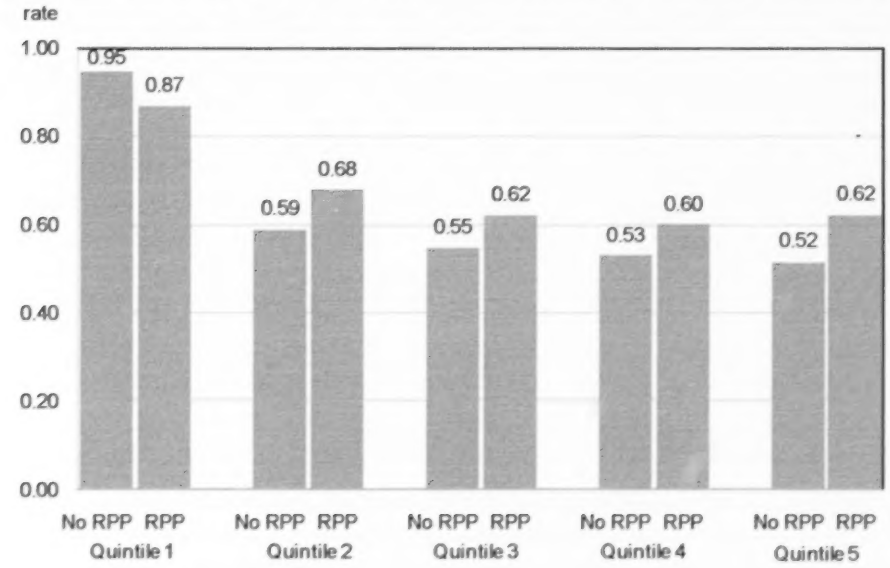
Note: "RPP" stands for registered pension plan.

When calculated over the 2005-2007 period, rather than for 2006 alone, the median earnings replacement rates of RPP non-members increases by two percentage points in most quintiles. For example, the median rate for RPP non-members in Q3 is 0.53 in 2006, but is 0.55 when measured over 2005-2007. The same pattern is evident among RPP non-members in Q1, Q4, and Q5.[5] Also, when calculated over the 2005-2007 period rather than for 2006 alone, the difference between the median replacement rates of RPP members and non-members in Q3, Q4, and Q5 narrows by two percentage points (Chart 3).

As a measure of central tendency, the median is less sensitive than the mean to values at the tails of the distribution. As shown in charts 4 through 8 and in the summary measures provided in Table 1, the replacement rate distributions of RPP members and RPP non-members are different.

4. The median replacement rate is the mid-point of the distribution, with one-half of the sample having a replacement rate below the median and one-half of the sample having a replacement rate above it.
5. The median earnings replacement rate for RPP members in Q2 increases by one percentage point when calculated over 2005-2007 rather than for 2006, but changes are not evident in the other four quintiles.

Chart 3
Median earnings replacement rates of retired men aged 70 to 72, by pension coverage and pre-retirement earnings quintile, 2005 to 2007



Note: "RPP" stands for registered pension plan.

Chart 4
Retired men from Quintile 1: Earnings replacement rates distribution in 2006, by pension coverage

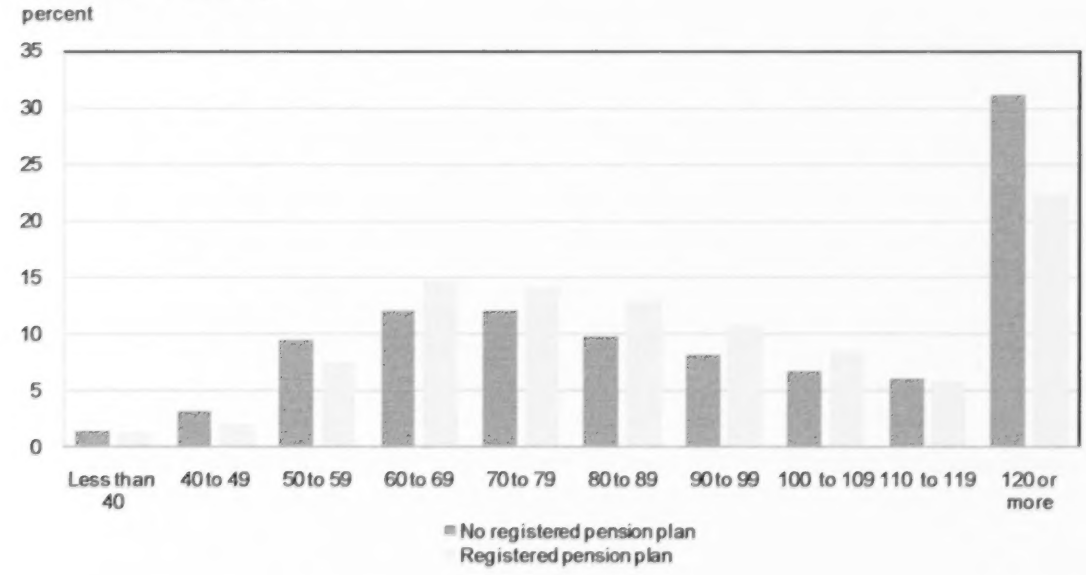


Chart 5
Retired men from Quintile 2: Earnings replacement rates distribution in 2006, by pension coverage

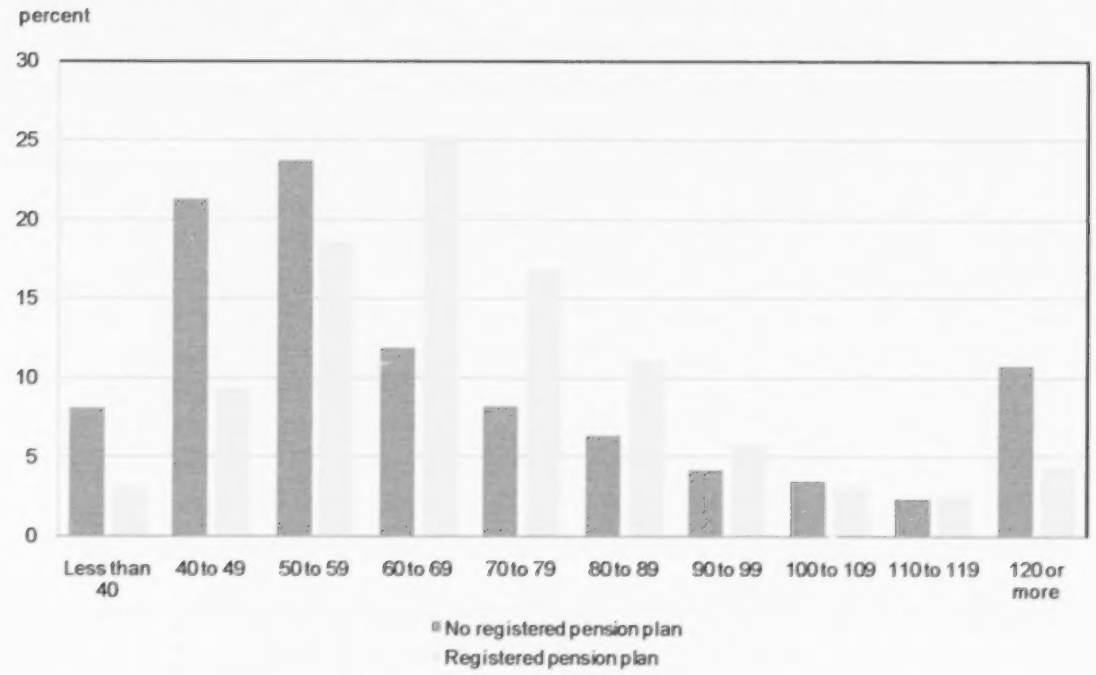


Chart 6
Retired men from Quintile 3: Earnings replacement rates distribution in 2006, by pension coverage

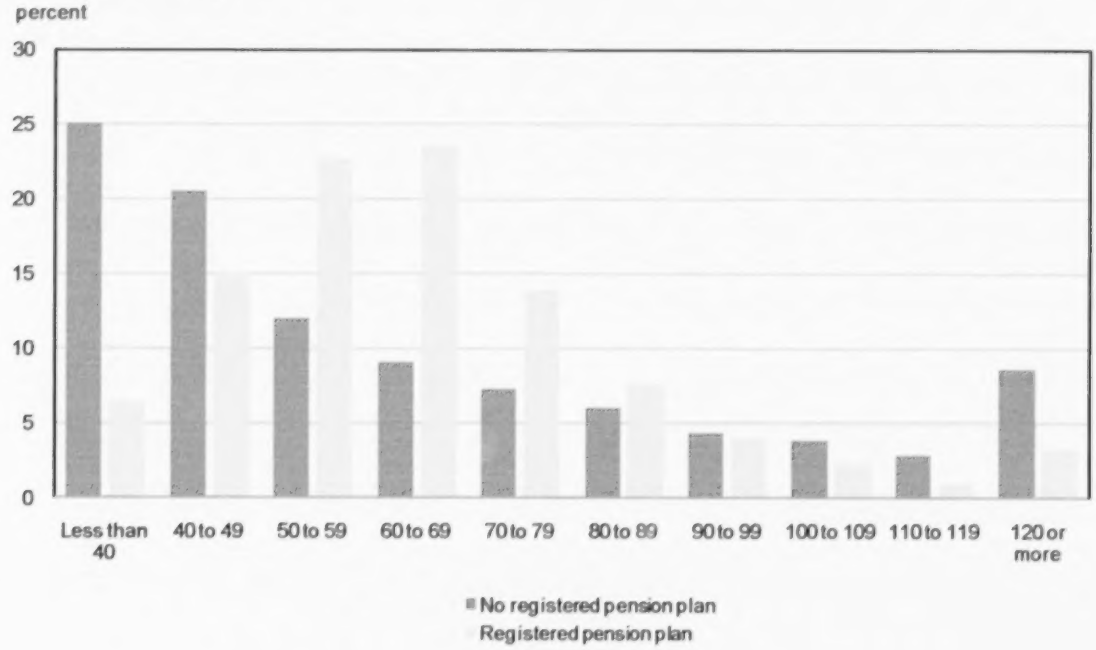


Chart 7
Retired men from Quintile 4: Earnings replacement rates distribution in 2006, by pension coverage

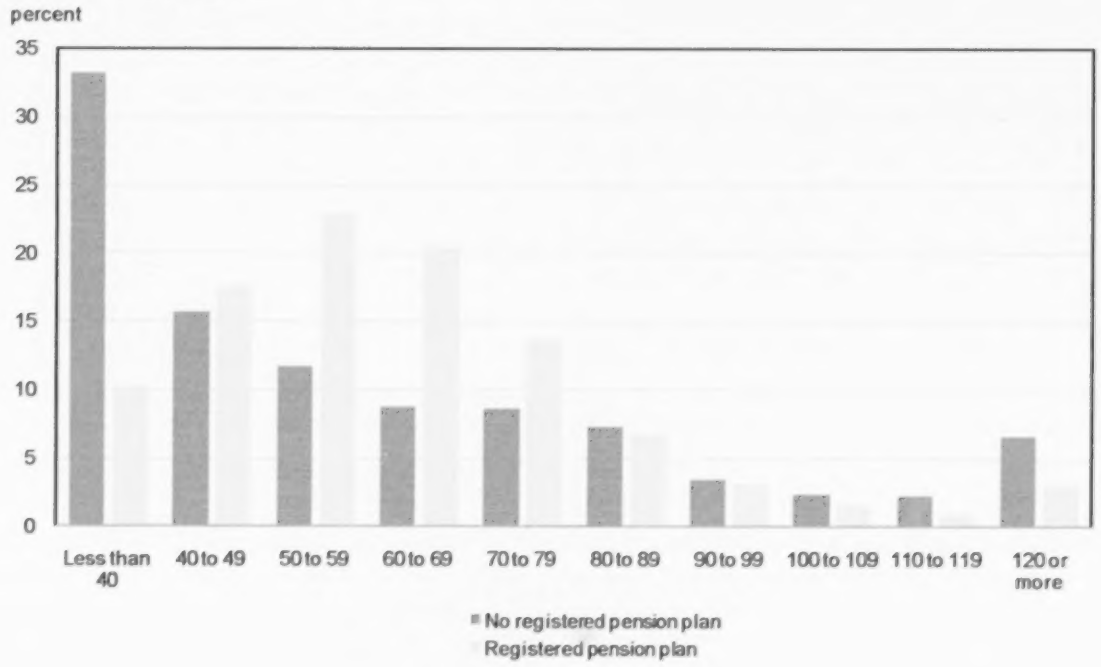


Chart 8
Retired men from Quintile 4: Earnings replacement rates distribution in 2006, by pension coverage

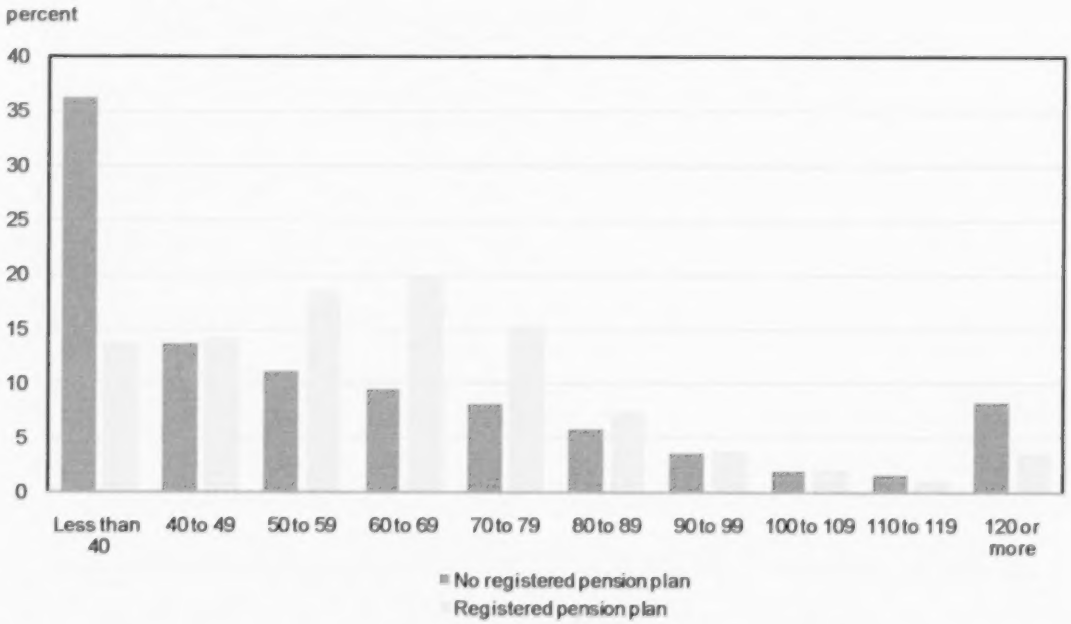


Table 1
Percent of retired men with earnings replacement rates below or above selected thresholds in 2006, by pension coverage and 1989 to 1991 earnings quintiles

	No registered pension plan	Registered pension plan	Difference
		percentage	
Quintile 1			
Less than .40	1.5	1.3	0.2
Less than .50	4.6	3.4	1.2
Less than .60	14.1	10.9	3.2
More than 1.00	43.9	36.5	7.4
Quintile 2			
Less than .40	8.1	3.1	5.0
Less than .50	29.3	12.4	16.9
Less than .60	53.1	31.0	22.1
More than 1.00	16.3	10.1	6.3
Quintile 3			
Less than .40	25.1	6.5	18.6
Less than .50	45.7	21.5	24.1
Less than .60	57.7	44.3	13.4
More than 1.00	15.3	6.5	8.9
Quintile 4			
Less than .40	33.3	10.2	23.1
Less than .50	49.1	27.7	21.3
Less than .60	60.8	50.7	10.1
More than 1.00	11.2	5.3	5.9
Quintile 5			
Less than .40	36.3	13.7	22.7
Less than .50	50.0	27.9	22.1
Less than .60	61.2	46.5	14.7
More than 1.00	11.8	7.0	4.8

In 2006, the largest shares of retired men from Q1 had earnings replacement rates of 1.00 or more. Those without pension coverage had lower earnings in 1989-1991 than did those with coverage (a difference in average earnings between the two groups of about $3,000), and this partially explains the larger share of RPP non-members with earnings replacement rates of 1.00 or more.

Among retired men from the middle of the 1989-1991 earnings distribution (i.e. Q2, Q3, and Q4), RPP non-members are more likely than RPP members to have earnings replacement rates below .40 in 2006 (Table 1). This difference ranges from 5 percentage points in Q2 to 23 percentage points in Q4. Similarly, RPP non-members are more likely to have earnings replacement rates below .50 and below .60 in that year.

When earnings replacement rates are calculated over 2005-2007, the shares of retired men below these thresholds decline by about one percentage point, and the magnitude of the difference between RPP members and RPP non-members narrows by about one percentage point (Appendix, Charts 2 to 6).

At the upper end of the distribution, larger shares of RPP non-members than members have earnings replacement rates of 1.00 or more in 2006. The magnitude of this difference ranges from six to nine percentage points among retired men in Q2, Q3, and Q4.

Overall, the distributions of earnings replacement rates differ considerably for RPP members and non-members. The large shares of RPP non-members with replacement rates below .40 are notable in this regard, as are the relatively large shares of RPP non-members with replacement rates below .50 or .60. At the other end of the distribution, RPP non-members are more likely than RPP members to have earnings replacement rates of 1.00 or more, although the magnitude of this difference between RPP members and non-members at the higher end of the distribution is smaller than the differences at the lower end of the distribution.

The calculation of replacement rates across the 2005-2007 period yields slightly higher estimates than those calculated for 2006 alone. For example, in most quintiles, the shares of RPP non-members with earnings replacement rates below specified thresholds decline by about one to three percentage points, and the median replacement rates of RPP non-members increase by two percentage points. The 2005-2007 approach has a more modest influence on the rates of RPP members, yielding a slightly narrower gap between the two groups.

4 Conclusions

This paper extends our earlier work (Ostrovsky and Schellenberg 2009), which compared the average replacement rates of men who had RPPs and men who did not have RPPs. In this study, we focus on an alternative measure—the median replacement rate—as this allows us to develop a richer picture of the relative outcomes of the two groups.

Comparisons of well-being between two groups based on income statistics face the difficulty of finding summary statistics that succinctly summarize differences in two populations that have a range of outcomes—varying from low to high replacement rates.

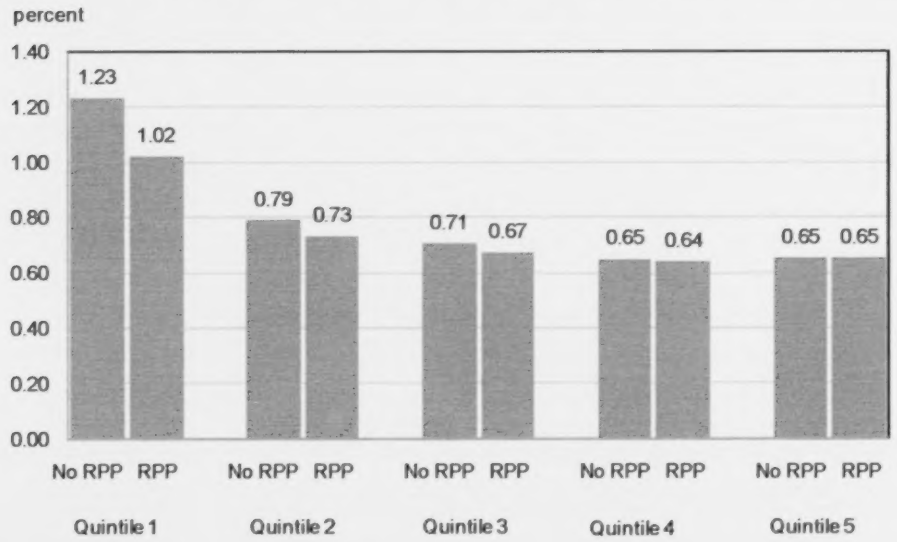
Means are commonly used to provide a measure of central tendencies of distributions. An alternate measure of central tendency is the median, which divides the population into two equal groups at a midpoint, with 50% of the observations above and 50% of the observations below. When distributions of observations are symmetric, the two measures will be the same; when the distributions are not symmetric, the two measures will differ.

The replacement rates for men without an RPP are about the same as those for men with an RPP when means (or averages) are compared, but are lower when medians are compared, as a result of asymmetry in the distributions. In fact, the replacement rates of both groups are asymmetric, with those of the non-RPP members having a greater degree of asymmetry.

Whether a person has an RPP depends on a complex set of choices and circumstances. The possession of an RPP may be perceived to involve a greater degree of certainty about retirement income than the reverse. Individuals without an RPP must rely on income streams from employment incomes, investment, capital gains, or the liquidation of business assets whose outcomes probably involve more uncertainty than the stream to be derived from a pension plan. The results of this study show that those without an RPP are subject to a range of outcomes whose variance is larger. On average, earnings replacement rates are about the same—but this is because there are a larger proportion of better outcomes along with a large proportion of poorer outcomes.

Appendix

Chart 1
Average earnings replacement rates of retired men aged 70 to 72, by pension coverage and pre-retirement earnings quintile, 2005 to 2007



Note: "RPP" stands for registered pension plan.

Table 2
Percent of retired men with earnings replacement rates below or above selected thresholds in 2005 to 2007, by pension coverage and 1989 to 1991 earnings quintiles

	No registered pension plan	Registered pension plan	Difference
		percentage	
Quintile 1			
Less than .40	0.6	0.4	0.1
Less than .50	3.3	2.6	0.7
Less than .60	12.3	10.4	1.9
More than 1.00	45.9	36.5	9.3
Quintile 2			
Less than .40	6.7	1.7	5.1
Less than .50	28.5	10.9	17.6
Less than .60	52.0	29.8	22.2
More than 1.00	16.8	9.7	7.1
Quintile 3			
Less than .40	23.5	5.7	17.8
Less than .50	44.4	20.9	23.4
Less than .60	55.2	44.5	10.7
More than 1.00	16.0	6.2	9.8
Quintile 4			
Less than .40	31.0	8.8	22.1
Less than .50	46.1	26.4	19.8
Less than .60	59.1	50.6	8.5
More than 1.00	12.2	5.2	7.0
Quintile 5			
Less than .40	35.4	13.0	22.4
Less than .50	47.9	28.0	19.8
Less than .60	59.2	45.8	13.4
More than 1.00	12.0	6.8	5.2

Chart 2
Retired men from Quintile 1: Earnings replacement rates distribution in 2005 to 2007, by pension coverage

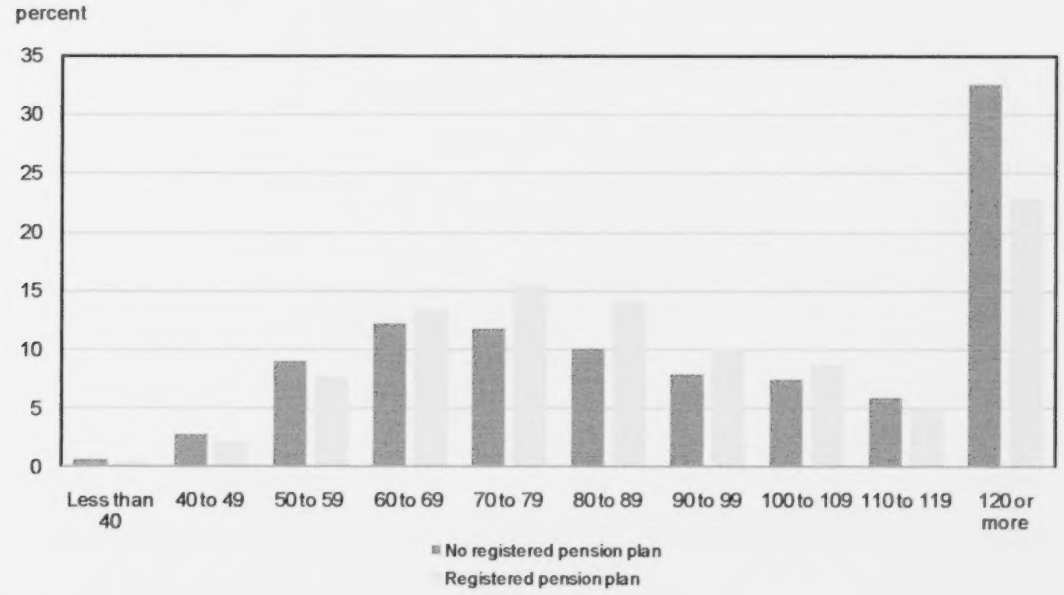


Chart 3
Retired men from Quintile 2: Earnings replacement rates distribution in 2005 to 2007, by pension coverage

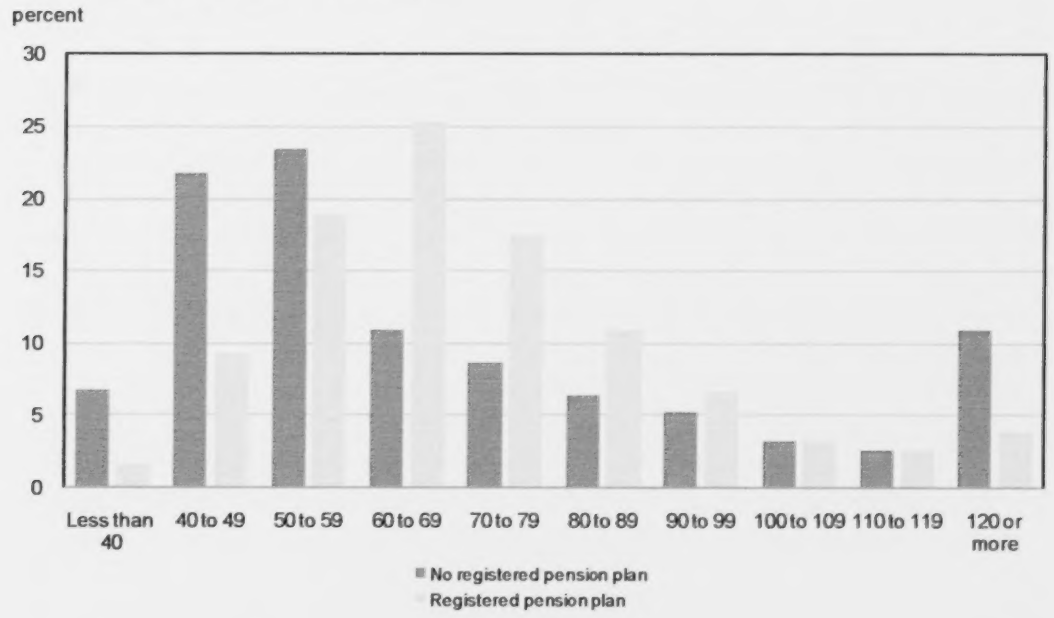


Chart 4
Retired men from Quintile 3: Earnings replacement rates distribution in 2005 to 2007, by pension coverage

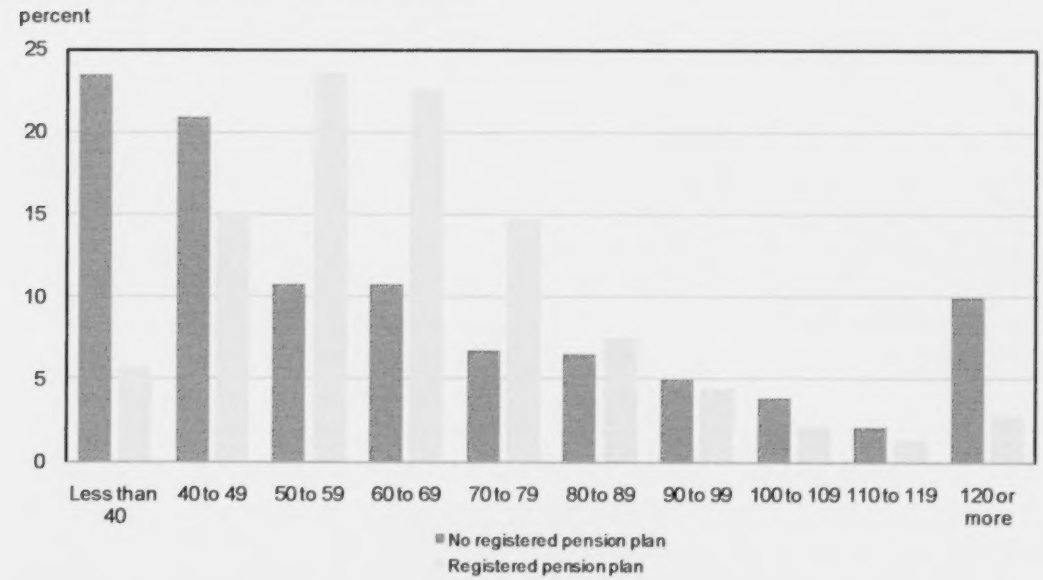


Chart 5
Retired men from Quintile 4: Earnings replacement rates distribution in 2005 to 2007, by pension coverage

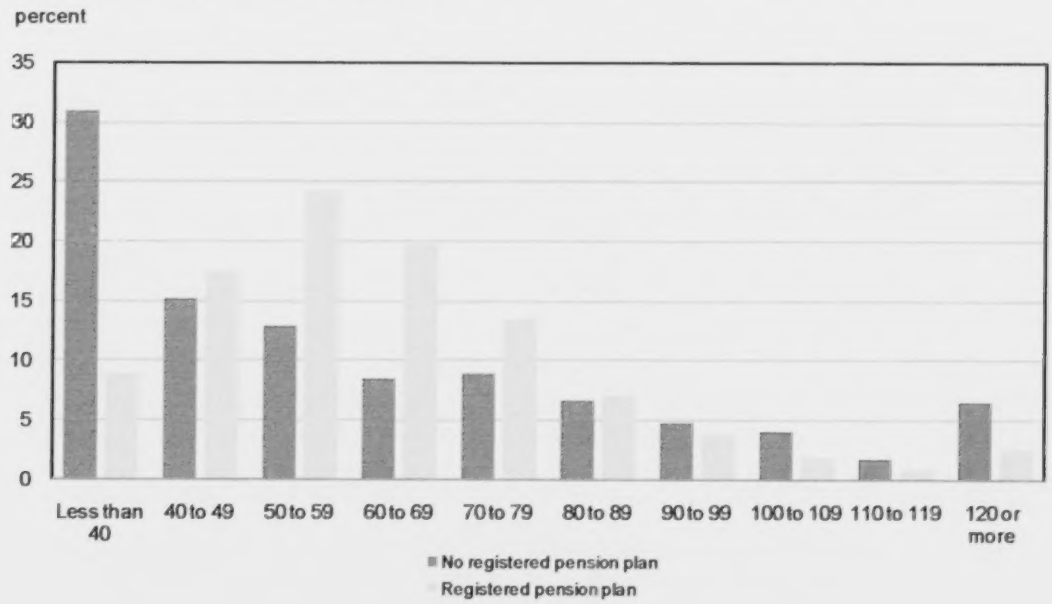
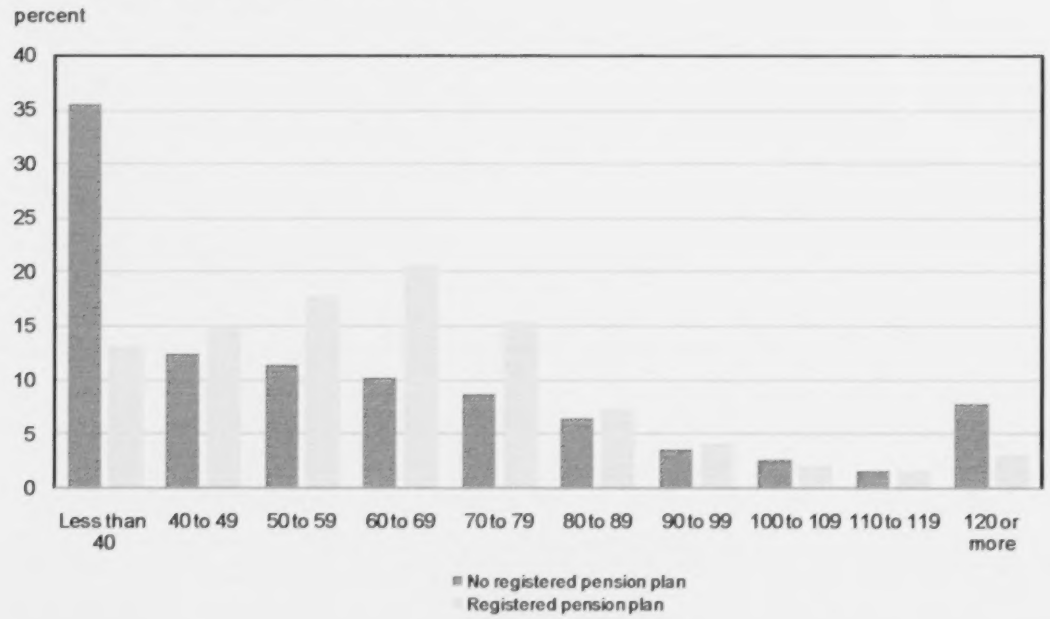


Chart 6
Retired men from Quintile 5: Earnings replacement rates distribution in 2005 to 2007, by pension coverage



Multivariate results

The descriptive results presented above do not take into account differences in the replacement rates of male retirees attributable to socio-economic characteristics, aside from pension coverage. In their original analysis, Ostrovsky and Schellenberg (2009) run an Ordinary Least Squares (OLS) regression model in which the earnings replacement rates achieved by retirees in 2006 is the dependent variable, and pension status, immigration status, marital status, years since retirement, and 1989-1991 earnings are included as explanatory variables. Separate regression models were run for retired men in each of the five 1989-1991 earnings quintiles. Selected results from that model—specifically, the coefficients associated with pension coverage—are presented in Panel 1 of Table 2. As noted earlier, RPP coverage is not significantly associated with earnings replacement rates in the original model.[6] This is also the case when earnings replacement rates in 2005-2007 are included as the dependent variable in the model (Panel 2).

However, when a dependent variable is a positive ratio (such as is the case with earnings replacement rates), economists and statisticians often prefer to use the log of the dependent variable (Y) in regression models. There are several reasons for doing so. First, if there are outliers in the distribution of the dependent variable, their influence on coefficient estimates will be considerably smaller when the variable in the regression is log(Y) rather than Y. Second, the distribution of log(Y) is often more likely than the distribution of Y to resemble a normal distribution than the distribution of Y. The normality of log(Y) improves the efficiency of estimates, and many statistical tests rely on the assumption of such normality. Finally, if the variable is log(Y), coefficient estimates can be interpreted as percentage changes in Y associated with marginal changes in the explanatory variables.

6. In Ostrovsky and Schellenberg (2009), the pension coefficient for retired men in Q2 is significant at p>.1. In Table 3 of this paper, only those coefficients significant at p>.05 are shown.

The results from the OLS regression, with the log of replacement rates included as the dependent variable, are shown in Panels 3 and 4 of Table 3. Considering log replacement rates in 2006, there is a consistent (across quintiles) and significant correlation with pension coverage, in the range of 6% to 10% among retirees in Q2, Q3, and Q4. The correlation is slightly weaker, in the range of 5% to 9% among retirees in Q2, Q3, and Q4, when log replacement rates over 2005-2007 are included as the dependent variable in the model.

Table 3
Selected Ordinary Least Squares (OLS) regression results on earnings replacement rates achieved by retired men

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
			percent		
Panel 1, 2006					
Unadjusted replacement rate					
No pension (reference group)	...	...	...	...	...
Pension	ns	ns	ns	ns	ns
Panel 2, 2005 to 2007					
Unadjusted replacement rate					
No pension (reference group)	...	...	...	...	...
Pension	ns	-0.039	ns	ns	ns
Panel 3, 2006					
Log replacement rate					
No pension (reference group)	...	...	...	...	...
Pension	0.054	0.064	0.081	0.104	0.190
Panel 4, 2005 to 2007					
Log replacement rate					
No pension (reference group)	...	...	...	...	...
Pension	0.038	0.057	0.050	0.089	0.164

Note: ns stands for not statistically significant.

References

Ostrovsky, Y., and Grant Schellenberg. 2009. *Pension Coverage, Retirement Status, and Earnings Replacement Rates Among a Cohort of Canadian Seniors*. Statistics Canada catalogue no. 11F0019M. Ottawa. Analytical Studies Branch Research Paper Series. No. 321.